INSTRUCTIONS

WATER PUMP
PARTS 125X1072 AND 125X1077

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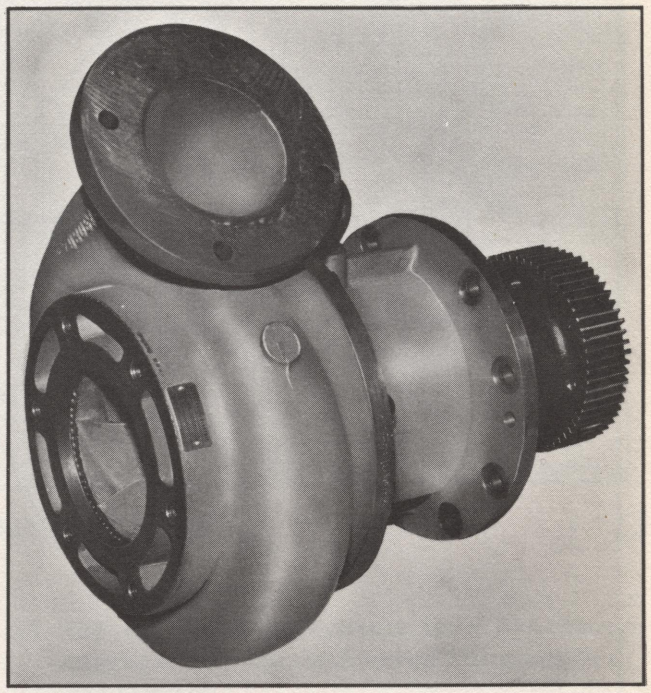


FIG. 1, E-20897

FIG. 1. WATER PUMP, EXTERIOR VIEW.

DESCRIPTION

The centrifugal, open-impeller type water pump, Fig. 1, mounted on the forward-end cover, circulates water throughout the cooling system. The pump shaft is gear-driven from the free end of the crankshaft. The pump is bolted to the engine by a flange which is part of the pump's bearing housing. The rabbet fit between the bearing housing and the engine cover assures correct gear alignment.

A 1/2-in. eyebolt is installed in the top of the pump housing to aid in lifting the pump when servicing is necessary. See Figs. 2 and 3.

The pump drive shaft rotates on two ball bearings which are pressed on the shaft and run submerged in engine lubricating oil.

Two different seals are used to keep the water and oil from the slinger enclosure between the two portions of the pump. The lube oil seal is a pressed, metal shell containing a bonded rubber seal ring. The rubber ring rides on the extended portion of the inner bearing race. The mechanical water seal contains a spring-loaded carbon ring rotating against a hardened steel ring and sealed by rubber rings.

A rubber slinger ring is mounted on the pump shaft and rotates in an enclosure which contains a tell-tale hole at the bottom. Water or oil leaking through their respective seals will drain from the tell-tale hole.

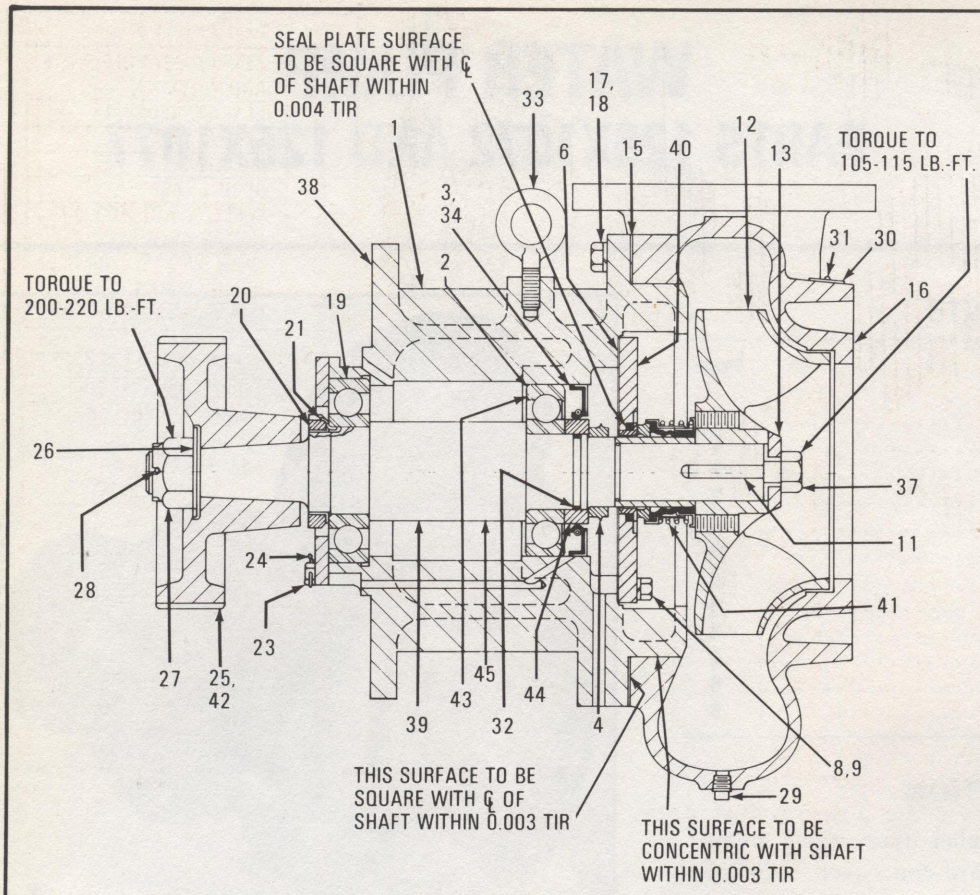
*Revisions are indicated by marginal bars.

REMOVAL FROM ENGINE

1. Drain the lube oil from the forward-end cover. See TAB DE-13, LUBRICATING OIL SYSTEM.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

Verify numbers for parts, tools, or material by using the Renewal Parts or Tool Catalogs, or contact your General Electric representative for assistance. Do not order from this publication.


SEAL PLATE SURFACE TO BE SQUARE WITH ℄ OF SHAFT WITHIN 0.004 TIR
TORQUE TO 105-115 LB.-FT.
TORQUE TO 200-220 LB.-FT.
THIS SURFACE TO BE SQUARE WITH ℄ OF SHAFT WITHIN 0.003 TIR
THIS SURFACE TO BE CONCENTRIC WITH SHAFT WITHIN 0.003 TIR

REF.	DESCRIPTION
1	WATER PUMP
2	BALL BEARING
3	OIL SEAL
4	SLINGER
6	GASKET
8	LOCKWASHER, 0.38
9	BOLT HEX., 3/8-16 X 1-1/4
11	KEY
12	IMPELLER
13	WASHER
15	GASKET
16	SCROLL CASE
17	LOCKWASHER, 0.50
18	BOLT, 0.50-13 X 1.50
19	BALL BEARING
20	LOCKWASHER
21	BEARING NUT
22	BEARING RETAINER
23	BOLT
24	LOCKWIRE, 1/16 X 3 FT.
25	GEAR
26	WASHER
27	CASTLE NUT, 1-1/4-12
28	COTTER PIN, 1/8 X 2-1/2
29	PIPE PLUG, 0.25 NPTF
30	NAMEPLATE
31	DRIVE SCREW, No. 4 X 0.25
32	O-RING
33	EYEBOLT, 1/2-13
34	SEALER
37	BOLT, 3/4-10 X 1-3/4
38	HOUSING
39	SHAFT
40	SEAL PLATE
41	WATER SEAL
42	GEAR
43	BALL BEARING
44	SLEEVE
45	SHAFT

FIG. 2, E-29178

FIG. 2. WATER PUMP ASSEMBLY.

2. Drain the water system. See DRAINING THE SYSTEM in the COOLING WATER SYSTEM instruction.

3. Remove the pipe flange bolts, loosen the inlet pipe Dresser coupling, and slide the coupling on the pipe to clear the joint.

4. Remove the pump inlet and discharge pipes.

5. Mount a suitable lifting hoist over the pump, and attach it to the pump lifting eyebolt.

6. Remove the pump mounting bolts, install the jack bolts in threaded holes in the flange, and evenly jack the pump from its rabbet fit.

DISASSEMBLY

Refer to Figs. 2 and 3.

1. Place the pump in a vertical position, with the suction opening down. Using a prick punch or cold chisel, match-mark the scroll case to the bearing housing. This mark will aid in positioning the scroll case during reassembly.

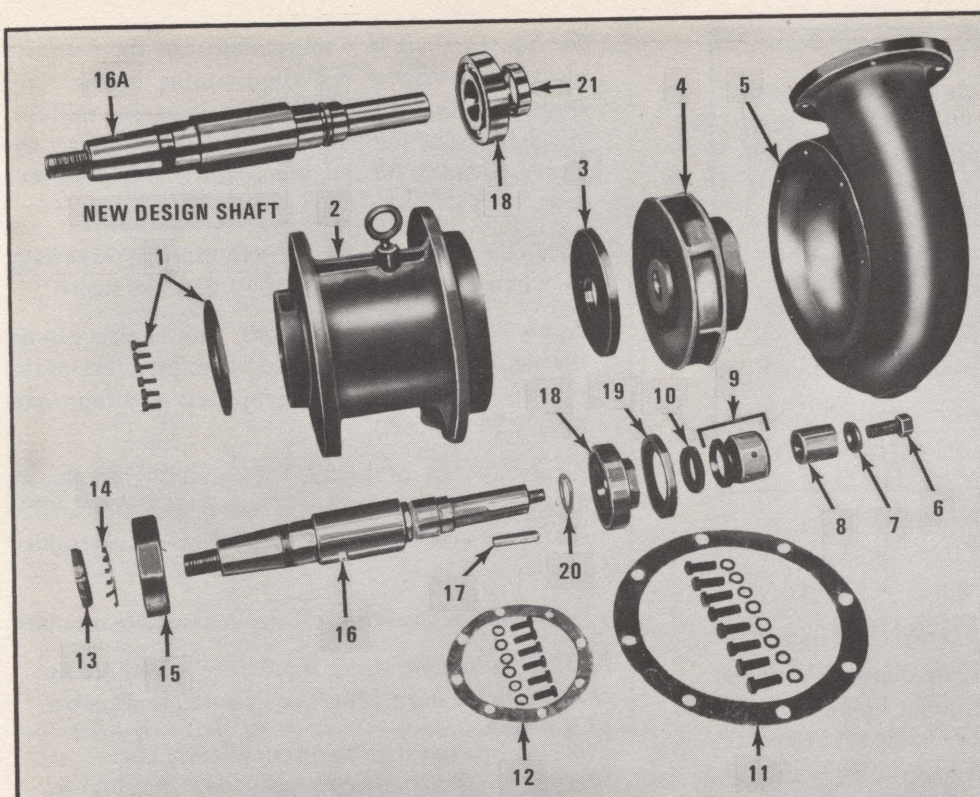
2. Remove the bolts from the bearing-housing flange.

3. Install the jacking bolts in the threaded holes provided.

4. Turn the jacking bolts to force the scroll case to separate evenly.

5. Lift the bearing housing off the scroll case.

FIG. 3, E-29179



REF.	DESCRIPTION
1	BEARING RETAINER PLATE AND BOLTS
2	BEARING HOUSING
3	SEAL PLATE
4	IMPELLER
5	SCROLL CASE
6	IMPELLER NUT (FOR OLD DESIGN SHAFT)
6A	IMPELLER BOLT (FOR NEW DESIGN SHAFT)
7	IMPELLER WASHER
8	SHAFT SLEEVE
9	WATER SEAL ASSEMBLY
10	SLINGER RING (RUBBER)
11	CASING GASKET AND MOUNTING BOLTS
12	SEAL PLATE GASKET AND MOUNTING BOLTS
13	NUT
14	LOCK RING
15	BEARING
16	SHAFT (OLD DESIGN)
16A	SHAFT (NEW DESIGN)
17	IMPELLER KEY
18	BEARING
19	OIL SEAL
20	O-RING
21	SLEEVE

FIG. 3. WATER PUMP ASSEMBLY, EXPLODED VIEW.

6. Place the bearing housing in a vertical position with the impeller up.
7. Remove the impeller nut or bolt and washer.
8. Place a puller tool on the end of the shaft, and engage the puller bolts into the threaded holes provided in the impeller.
9. Turn the puller jack screw until the impeller and key are removed. A soft flame, applied evenly to the surface of the impeller while turning the puller jack screw, will assist in breaking the impeller loose.
10. Remove the rotating portion of the water seal assembly.
11. Remove the seal-plate bolts and seal plate which contains the stationary portion of the water seal.

NOTE: ***It is not necessary to remove the pump drive gear unless shaft or bearing work is required. If required, the gear may be removed by using a puller tool and threaded holes provided.***

12. Lay the bearing housing on its side. Remove the drive-end-bearing retainer-plate bolts and the retainer plate.
13. Tap the shaft and bearings from the bearing housing out through the drive end. Use a rawhide or lead hammer.
14. Tap the oil seal from the bearing housing.

INSPECTION

Clean and inspect all parts. The ball bearings should rotate freely, with no roughness or catching.

Remove any burrs from the shaft and keys, using a fine file and No. 320 grit emery cloth.

Examine the sealing surface (outside diameter) of the shaft sleeve. If scratched, grooved, or nicked, replace with a new sleeve.

SHAFT MODIFICATION

With the introduction of the new two-piece bearing sleeve arrangement, the O-ring groove must be relocated to prevent lube oil leakage. Old shafts may be modified as shown in Fig. 4.

NOTE: ***Refer to DISASSEMBLY for removal of the shaft for machining.***

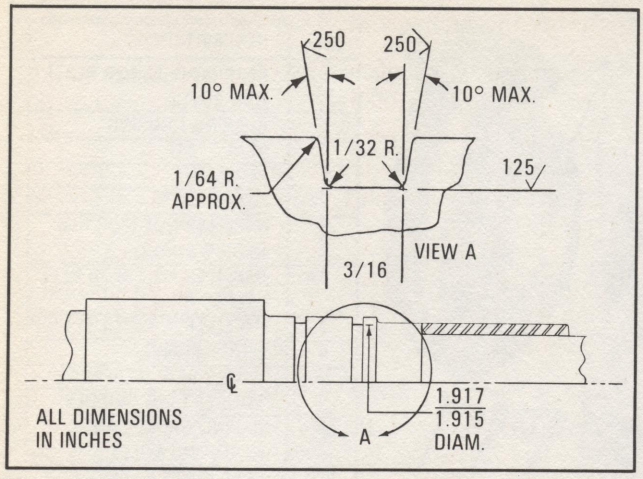


FIG. 4. NEW O-RING GROOVE MACHINING DIMENSIONS.

FIG. 4, E-29180

IMPELLER MODIFICATION

If not already done, use a 17/32 in. diameter drill and drill completely thru the tapped puller holes. This will provide better circulation of coolant behind the impeller. See Fig. 2.

SHAFT REPAIR OR MODIFICATION

Since mid-1973, the impeller nut on new production pumps has been replaced with a bolt. The shaft was also changed to accept the bolt instead of the nut. Tighten either the bolt or nut to the same torque value. See DATA section.

NOTE: ***The shafts of older pumps may be repaired, or modified to current-production standard, by:***

1. ***Machining off the male thread portion of the shaft.***
2. ***Tap drill (21/32 in. diameter) a hole in the end of the shaft 2 in. deep.***
3. ***Countersink the hole to 7/8 in. diameter.***
4. ***Tap the hole with a 3/4 in.-10 tap to a 1-1/2 in. depth.***
5. ***Use a new hex-head bolt with nylon locking insert, Part 115X2344, to secure the impeller washer and impeller.***

SHAFT SLEEVE REPLACEMENT

When performing this operation, it is permissible to retain the bearings and gear on the shaft, but they should be wrapped with paper or clean rags and sealed to prevent chips and dirt entering the bearings during the following procedure:

1. Set up the shaft in a lathe, and turn the defective sleeve to within a few thousandths of the shaft diameter (see DATA section). Using a fine mill file, file a flat spot the length of the sleeve to part the sleeve, then slip the thin remaining part of the sleeve from the shaft.
2. Clean the shaft and new sleeve thoroughly, especially the contact surfaces of the shaft with the sleeve.
3. Apply Locquic* Primer, Grade T to the sleeve fit on the shaft and to the bore and chamfered face of the sleeve. Allow primer to completely dry (approximately 10 minutes).
4. Apply a bead of Loctite* Plastic Gasket No. 49 around the entire radius at the intersection of the shaft face and diameter which locate the assembled sleeve.
5. Heat the new sleeve to 250 F and assemble on shaft.

NOTE: ***Assemble sleeve so the face, with 1/16 in. chamfer in the bore, is in contact with the shoulder of the shaft.***

REASSEMBLY

CAUTION: ***Protect the shaft-sleeve sealing surface during all assembly operations to avoid surface damage and subsequent seal leakage.***

NOTE: ***Both bearings have been pressed onto the shaft with a force from 2000 to 5000 pounds, and at least as much force will be required to remove them. It is not necessary to remove them, unless they must be replaced.***

1. If new bearings are to be installed, press on the inner bearing first. The extended inner race must face the impeller end of the shaft. Before installing the inner bearing, remove and replace the O-ring located in the groove on the shaft.
2. Press on the bearing at the drive gear end. Install the nut and lock ring.

CAUTION: ***When installing the bearings, force must be applied to the inner race only. To apply force to the outer race will ruin the bearing.***

3. Place the bearing housing in a vertical position, drive end up.
4. Install the pump shaft and the bearing retainer plate. Secure the retainer bolts with lockwire.

*Product of Loctite Corp., Newington, Conn.

FIG. 5, E-22256A

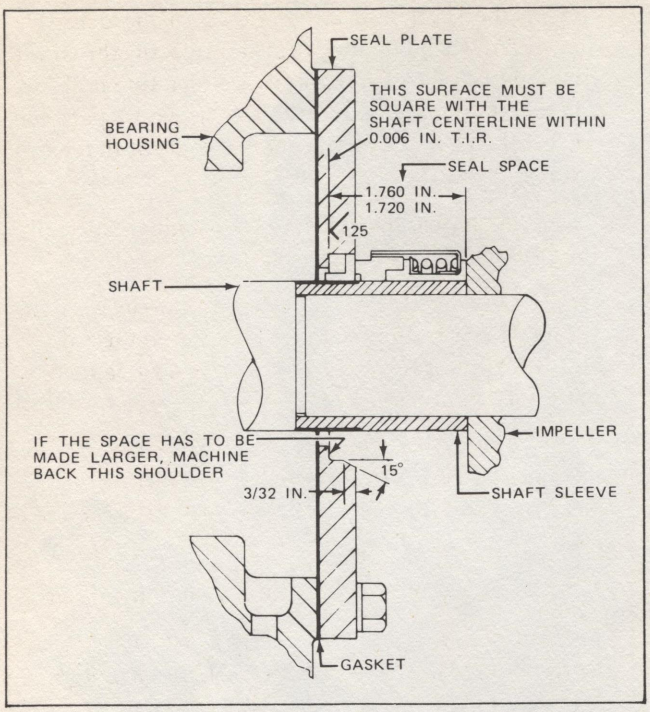


FIG. 5. SEAL SPACE MEASUREMENT.

5. Turn the bearing housing over. Install the shaft oil seal, hollow side inward. Use the tapered seal protector tool, Part 147X1210, to expand the seal. Place the tool over the shaft and against the inner bearing race, with its tapered end toward the impeller end of the shaft. Care must be taken that the seal is pressed in evenly; otherwise, its shell will be distorted and oil leakage will result.

   If the seal has a plain steel case, coat the outside diameter with a small amount of Permatex† Aviation Grade No. 3, Part 497A806P32.

FIG. 6, E-22790

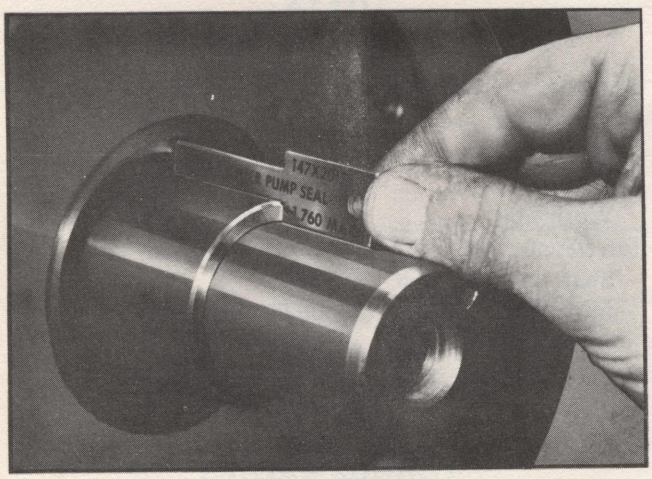


FIG. 6. USE STEP GAGE, PART 147X2017, TO CHECK SEAL SPACE FOR PROPER DIMENSION.

†Product of Permatex Co., Inc., Kansas City, Kan.

6. Install the rubber slinger ring on the shaft.

7. Temporarily install the seal plate and a new gasket into position, and secure them to the bearing housing. Check the seal locating face with a dial indicator secured to the shaft. This face must be square with the shaft centerline within 0.006 in. T.I.R. See Fig. 5.

8. Measure the seal space. See Figs. 5 and 6. If seal is not within the 1.760-1.720 in. dimension, correct by one of the following methods:

   a. If the dimension must be reduced, shim with extra gasket(s), Part 115X1217, between the seal plate and the bearing housing.

   b. If the dimension must be increased, machine back the shoulder and chamfer as shown on Fig. 5.

9. Install the stationary water seal rubber and steel ring into the seal plate.

10. Place the seal plate into position over a new gasket and secure it with bolts. Partially tighten the bolts, equalize the clearance between the stationary steel seal ring and shaft, then tighten the bolts evenly to prevent distortion of the seal plate.

11. Using a lint-free rag or tissue, wipe all dirt from the face of the stationary steel seal ring, from the face of the carbon seal ring, and from the surface of the shaft sleeve. Apply a thin film of light lubricating oil to these surfaces and to the bore of the rubber shaft seal. Then carefully assemble the rotating portion of the seal **partially** on the shaft sleeve, Fig. 7.

12. Position seal installation tool, Part 147X2018, and press the rotating portion of the seal to proper position. See Figs. 8 and 9. Use a hydraulic or manual arbor press for this operation; DO NOT USE A MALLET OR HAMMER. If a press is not available, a jacking bolt or nut on the shaft-end threads can be used to apply pressure to force the seal to its final working position.

13. Install the impeller key in the shaft, and press the impeller onto the shaft until it seats against the shaft sleeve.

14. Install the impeller washer and self-locking nut or bolt.

15. Rotate the pump shaft and insure the shaft rotates freely.

16. Lay the pump scroll case on its suction side and align a new gasket with the bolt holes.

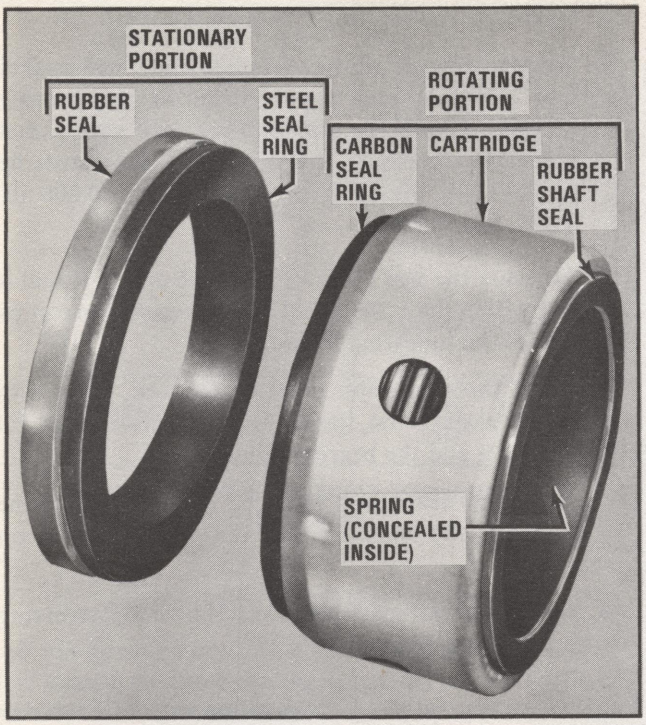


FIG. 7. CURRENT-PRODUCTION WATER SEAL ASSEMBLY (APPLIED STARTING EARLY-1975).

17. Assemble the bearing housing assembly to the scroll case. Align the match-marks made at disassembly and secure with bolts. The pump shaft must rotate freely when the pump is completely assembled.

INSTALLATION ON ENGINE

1. Install the pump, using a new gasket. Properly align the drive-gear teeth and the pump register fit. Install the bolts finger-tight.

CAUTION: ***Care must be taken to insure the pipe flange alignment is correct; otherwise, the pump casing may be distorted and broken.***

2. Assemble the cast discharge pipe, using new gaskets. Assemble discharge elbow and pump mounting bolts finger-tight first; then snug all bolts lightly, and finally tighten securely.
3. Reassemble the inlet pipe using new gaskets.
4. Before barring over the engine, fill the water system to the proper level and add treatment.
5. Add lubricating oil to the crankcase to the proper level.

NOTE: ***A small amount of water seal leakage may be noted on a newly installed pump. However, after a short period of operation, the water seal should become seated, thus stopping all leakage.***

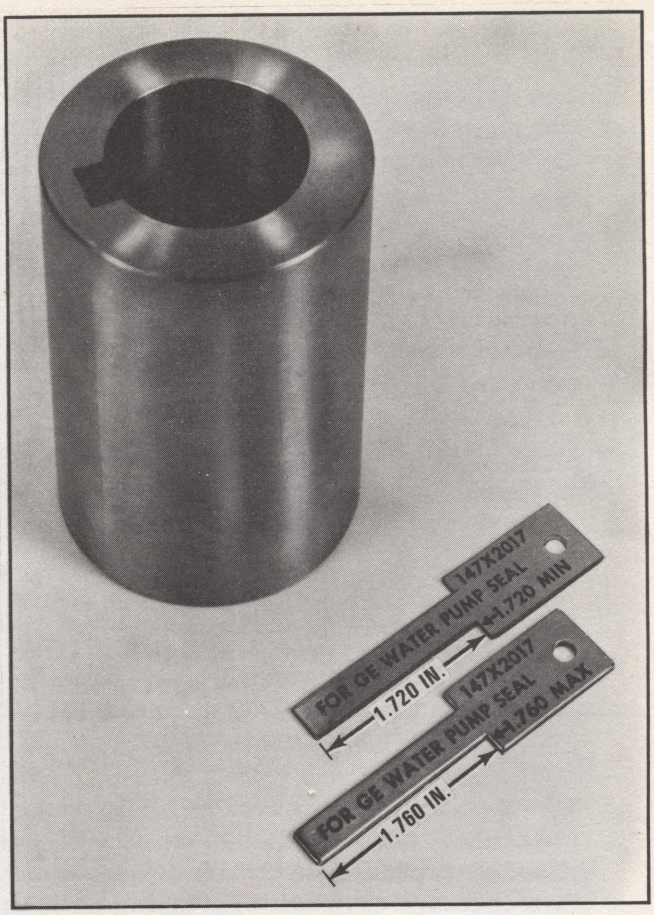


FIG. 8. SEAL INSTALLATION TOOL AND TWO OF THE STEP GAGES. ONE HAS BEEN TURNED OVER TO SHOW THE REVERSE SIDE.

DATA

	in.	mm
Impeller to Scroll Case Clearance (on diameter)		
New	0.009-0.015	0,229-0,381
Worn Max.	0.030	0,762
Interference Fit — Shaft to Sleeve and Impeller	0.000-0.002	0,00-0,05
Shaft Diameter (for sleeve and impeller fit)	1.6265-1.6255	41,313-41,288

TORQUE VALUES

	lb.-ft.	N·m
Drive Gear Nut	200-220	271-298
Impeller Nut or Bolt	105-115	142-156

FIG. 7, E-22257A

FIG. 8, E-22789

FIG. 9, E-22791

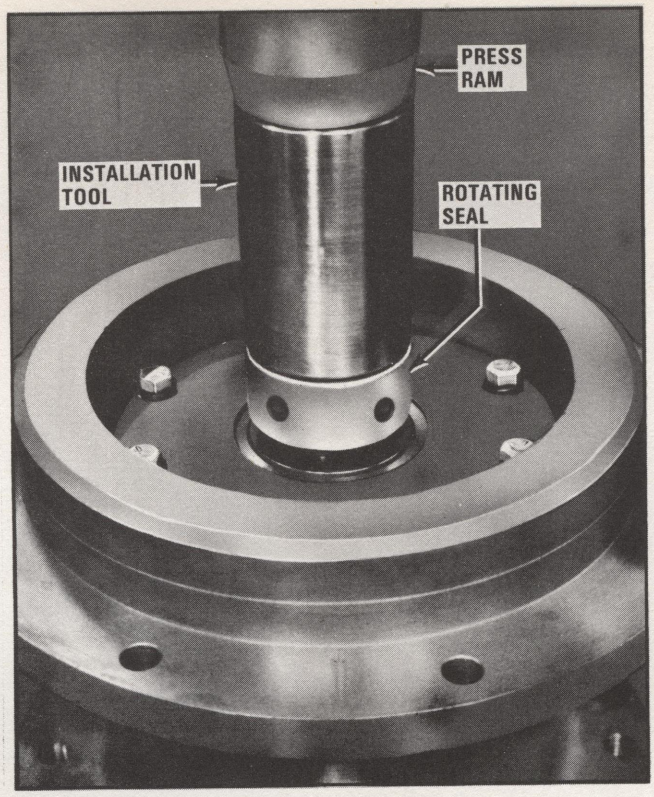


FIG. 9. INSTALLATION TOOL PRESSES SEAL INTO ITS FINAL CORRECT POSITION. HYDRAULIC PRESS OR OTHER MECHANICAL FORCE IS REQUIRED. DO NOT USE MALLET.

NOTES: